# 1.9.12

AI24BTECH11021 - Manvik Muthyapu

**Question**:

Find the length of the segment joining $A(-6, 7)$ and $B(-1, -5)$. Also, find the midpoint of $AB$. (10, 2021)

**Solution:**

A $= \begin{pmatrix} -6 \\ 7 \end{pmatrix}$ and B $= \begin{pmatrix} -1 \\ -5 \end{pmatrix}$, then length of line segment is $\|B - A\|$.

$$B - A = \begin{pmatrix} -1 \\ -5 \end{pmatrix} - \begin{pmatrix} -6 \\ 7 \end{pmatrix} \tag{1}$$

$$= \begin{pmatrix} 5 \\ -12 \end{pmatrix} \tag{2}$$

$$\|B - A\| = \sqrt{(5)^2 + (-12)^2} = \sqrt{169} \tag{3}$$

$$= 13 \tag{4}$$

$\therefore$ The length of line segment is 13 units.

Midpoint M of AB is $\frac{A+B}{2}$

$$M = \frac{A + B}{2} \tag{5}$$

$$= \frac{\begin{pmatrix} -6 \\ 7 \end{pmatrix} + \begin{pmatrix} -1 \\ -5 \end{pmatrix}}{2} = \frac{\begin{pmatrix} -7 \\ 2 \end{pmatrix}}{2} \tag{6}$$

$$= \begin{pmatrix} -3.5 \\ 1 \end{pmatrix} \tag{7}$$